

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date  
23 October 2003 (23.10.2003)

PCT

(10) International Publication Number  
**WO 2003/086675 A3**

(51) International Patent Classification<sup>7</sup>: **E21B 19/16**

(21) International Application Number:  
**PCT/US2003/006544**

(22) International Filing Date: 4 March 2003 (04.03.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/372,048 12 April 2002 (12.04.2002) US

(71) Applicant (for all designated States except US): ENVENTURE GLOBAL TECHNOLOGY [US/US]; 16200 A Park Row, Houston, TX 77084 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): COSTA, Scott

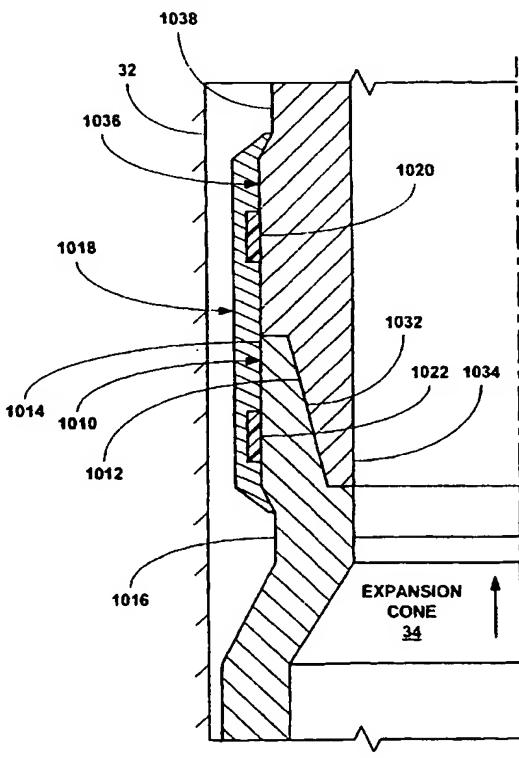
[US/US]; 2011 Willow Point, Kingwood, TX 77339 (US). HOCKADAY, Joel, Gray [US/US]; 17318 Ginger Fields Lane, Tomball, TX 77375 (US). WADDELL, Kevin, K. [US/US]; 11007 Sprucedale Court, Houston, TX 77070 (US). RING, Lev [RU/US]; 14126 Heatherhill Place, Houston, TX 77077 (US). BULLOCK, Michael [US/US]; 19827 Sky Country, Houston, TX 77094 (US). COOK, Robert Lance [US/US]; 934 Caswell Court, Katy, TX 77450 (US). KENDZIORA, Larry [US/US]; 6518 Williams School Court, Needville, TX 77461 (US). BRISCO, David, Paul [US/US]; 405 Westridge Drive, Duncan, OK 73533 (US). JACKSON, Tance [US/US]; 7209 Ridgemoor Lane, Plano, TX 75025 (US).

(74) Agents: MATTINGLY, Todd, et al.; Haynes and Boone, LLP, 1000 Louisiana Street, Suite 4300, Houston, TX 77002-5012 (US).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,

*[Continued on next page]*

(54) Title: PROTECTIVE SLEEVE FOR THREADED CONNECTIONS FOR EXPANDABLE LINER HANGER



(57) Abstract: A tubular sleeve (1018) is coupled to and overlaps the threaded connection (1012, 1032) between a pair of adjacent tubular members (1016, 1038).

WO 2003/086675 A3

BEST AVAILABLE COPY



GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,  
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,  
MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG,  
SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN,  
YU, ZA, ZM, ZW.

(84) **Designated States (regional):** ARIPO patent (GH, GM,  
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),  
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,  
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,  
SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM,  
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Declaration under Rule 4.17:**

— *of inventorship (Rule 4.17(iv)) for US only*

**Published:**

— *with international search report*  
— *before the expiration of the time limit for amending the  
claims and to be republished in the event of receipt of  
amendments*

(88) **Date of publication of the international search report:**  
5 August 2004

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US03/06544

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) : E21B 19/16  
US CL : 166/380, 85.3, 309, 387, 72, 73; 285/382.7, 398

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 166/380, 85.3, 309, 387, 72, 73, 187, 195, 206, 207, 212, 216, 217; 285/382.7, 398, 55, 388.1

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
None

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
EAST

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6,405,761 B1 (SHIMIZU et al) 18 June 2002, see entire document	1-120
A	US 5,971,443 A (NOEL et al) 26 October 1999, see entire document	1-120
A	US 5,309,621 A (O'DONNELL et al) 10 May 1994, see entire document	1-120
A	US 3,997,193 A (TSUDA et al) 14 December 1976, see entire document	1-120
A	US 3,989,280 A (SCHWARZ) 02 November 1976, see entire document	1-120
A	US 3,834,742 A (MCPHILLIPS) 10 September 1974, see entire document	1-120
A	US 3,579,805 A (KAST) 25 May 1971, see entire document	1-120
A	US 2,647,847 A (BLACK et al) 04 August 1953, see entire document	1-120
X	US 4,693,498 A (BLAUGH et al) 15 September 1987, see Fig. 2a and 2b.	54

Further documents are listed in the continuation of Box C.  See patent family annex.

- \* Special categories of cited documents:
- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "Q" document member of the same patent family

Date of the actual completion of the international search

30 July 2003 (30.07.2003)

Date of mailing of the international search report

09 JUN 2004

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
Facsimile No. (703)305-3230

Authorized officer

Roger J. Schoeppe

Telephone No. (703) 306-4180

PCT/US03/06544

INTERNATIONAL SEARCH REPORT

C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,275,556 B1 (KINNEY et al) 14 August 2001. see Fig. 3	54

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US03/06544

**Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)**

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claim Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claim Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claim Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:  
Please See Continuation Sheet

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**  

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

**INTERNATIONAL SEARCH REPORT****BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING**

The inventions listed as Groups I-IV do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

The independent claims of the Group I inventions all require the radial-plastic deformation of a jointed tubular connection whereas the independent claims of Group II inventions make no such requirement. Group III claims differ in that the independent claims require the radial-plastic deformation of the tubular connections in a method and/or apparatus used in extracting geothermal energy from a geothermal well whereas the Group IV invention makes no such deformation requirement. The Group I and II claims further differ in requiring tubular connections involving internal or external tubular threads with corresponding internal or external threaded sleeve ends. The independent claims of Groups III and IV all require their use as a liner in the completion of a well to be used in extracting geothermal energy.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim(s) 1-53, drawn to a "Method."

Group II, claim(s) 54-110, drawn to an "Apparatus."

Group III, claim(s) 111-119, drawn to a "Method and Apparatus for Extracting Geothermal Energy."

Group IV, claim(s) 120, drawn to an "Apparatus for Extracting Geothermal Energy."

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- BLACK BORDERS**
- IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- FADED TEXT OR DRAWING**
- BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- SKEWED/SLANTED IMAGES**
- COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- GRAY SCALE DOCUMENTS**
- LINES OR MARKS ON ORIGINAL DOCUMENT**
- REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- OTHER: \_\_\_\_\_**

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**